

Module 1 Acid-Base Balance

The Concept of Acid-Base Balance

A client who has been fasting and has ketones in the urine is brought to the emergency department (ED) unconscious. Which acid-base imbalance would the nurse expect to assess in this client?

Metabolic acidosis

Respiratory alkalosis

Metabolic alkalosis

Respiratory acidosis

Answer: A

Explanation: A) A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids.

A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in respiratory alkalosis.

A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in metabolic alkalosis.

A client who is fasting is at risk for development of metabolic acidosis. The body recognizes fasting as starvation and begins to metabolize its own fatty acids into ketones, which are metabolic acids. Starvation would not result in respiratory acidosis.

Page Ref: 5

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is caring for a client in the emergency department. Which factors will the nurse identify that increase the client's risk for metabolic acidosis? **Select all that apply.**

Abdominal fistulas

Chronic obstructive pulmonary disease

Pneumonia

Chronic renal failure

Hypovolemic shock

Answer: A, D, E

Explanation: A) Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another condition such as an abdominal fistula which can cause the loss of bicarbonate from the intestine.

Chronic obstructive pulmonary disease places the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

Pneumonia places the client at risk for respiratory acidosis with the increased retention of carbon dioxide in the blood.

Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another condition such as chronic renal failure. In this health problem, the kidneys are unable to excrete a normal amount of hydrogen ions in the urine. This results in an excessive amount of hydrogen ions in the blood, which produces metabolic acidosis.

Metabolic acidosis is rarely a primary disorder. It usually develops during the course of another condition such as hypovolemic shock. With a severe blood loss, there is a lack of blood flow throughout the body and a lack of oxygen in every cell. Adenosine triphosphate (ATP) must produce energy anaerobically without the presence of oxygen; lactic acid is a by-product. This produces systemic lactic acidosis, a type of metabolic acidosis.

Page Ref: 5-6

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health

problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

A client with acute asthma has a PaCO₂ of 48 mmHg, a pH of 7.31, and a normal HCO₃ arterial blood gas value. Which condition will the nurse associate with these values?

Metabolic acidosis

Respiratory alkalosis

Respiratory acidosis

Metabolic alkalosis

Answer: C

Explanation: A) Uncompensated metabolic acidosis has a decreased pH, normal PaCO₂, and decreased HCO₃.

Uncompensated respiratory alkalosis has an increased pH, decreased PaCO₂, and normal HCO₃.

If the pH is decreased and the PaCO₂ is increased with a normal HCO₃, it is uncompensated respiratory acidosis.

Uncompensated metabolic alkalosis has an increased pH, normal PaCO₂, and increased HCO₃.

Page Ref: 7

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Essential Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment
Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is reviewing the latest arterial blood gas results for a client with metabolic alkalosis. Which result indicates that the metabolic alkalosis is compensated?

pH 7.32

PaCO₂ 18 mmHg

HCO₃ 8 mEq/L

PaCO₂ 48 mmHg

Answer: D

Explanation: A) A normal pH level is 7.35-7.45. A pH of less than 7.35 is acidosis.

A PaCO₂ level of 18 mmHg is low and is seen in respiratory alkalosis.

A HCO₃ level of 8 mEq/L is low and is most likely associated with metabolic acidosis.

In metabolic alkalosis, there is an excess of bicarbonate. To compensate for this imbalance, the rate and depth of respirations decrease, leading to retention of carbon dioxide. The PaCO₂ will be elevated.

Page Ref: 8

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Essential Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation

Learning Outcome: 1.2. Differentiate alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

A client is diagnosed with chronic obstructive pulmonary disease. Which test provides the most accurate indicator of the client's acid-base balance?

Arterial blood gases (ABGs)

Pulse oximetry

Sputum studies

Bronchoscopy

Answer: A

Explanation: A) Acid-base balance is assessed primarily by measuring arterial blood gases (ABGs). Arterial blood is most often used because it reflects acid-base balance throughout the entire body better than venous or capillary blood that has dispersed oxygen into the tissues and has collected carbon dioxide.

Pulse oximetry is a noninvasive test that evaluates the oxygen saturation level of blood.

Sputum studies can provide specific information about bacterial organisms.

A bronchoscopy provides visualization of internal respiratory structures.

Page Ref: 10

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is instructing a client with a history of acidosis on the use of sodium bicarbonate. Which client statement indicates that additional teaching is needed?

"I should contact the doctor if I have any gastric discomfort with chest pain."

"I need to purchase antacids without salt."

"I should use the antacid for at least 2 months."

"I should call the doctor if I get short of breath or start to sweat with this medication."

Answer: C

Explanation: A) The client should be instructed to immediately contact the primary healthcare provider if gastric discomfort occurs with chest pain.

The client should be instructed to use non-sodium antacids to prevent the absorption of excess sodium or bicarbonate into systemic circulation.

The client should be instructed to not use any bicarbonate antacid for longer than 2 weeks.

The client should be instructed to immediately contact the primary healthcare provider if dyspnea or diaphoresis occurs.

Page Ref: 6

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: patient/family/community preferences, values; coordination and integration of care; information, communication, and education; physical comfort and emotional support; involvement of family and friends; Transition and continuity. | AACN Domains and Competencies: 5.2 Contribute to a culture of patient safety. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. |

Nursing Process: Evaluation

WWW.TBSM.WS

Learning Outcome: 1.7. Summarize collaborative therapies used by interdisciplinary teams for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

A client is receiving sodium bicarbonate intravenously (IV) for correction of acidosis secondary to diabetic coma. The nurse assesses the client to be lethargic, confused, and breathing rapidly. Which action will the nurse take?

Stop the infusion and notify the physician because the client is in alkalosis.

Decrease the rate of the infusion and continue to assess the client for symptoms of alkalosis.

Continue the infusion, because the client is still in acidosis, and notify the healthcare provider.

Increase the rate of the infusion and continue to assess the client for symptoms of acidosis.

Answer: C

Explanation: A) The client's symptoms do not indicate alkalosis so infusion should not be stopped.

The client receiving sodium bicarbonate is prone to alkalosis; monitor for cyanosis, slow respirations, and irregular pulse.

The client continues to exhibit signs of acidosis; symptoms of acidosis include lethargy, confusion, CNS depression leading to coma, and a deep, rapid respiration rate that indicates an attempt by the lungs to rid the body of excess acid, and the physician should be notified.

The infusion should not be increased or decreased without a practitioner order.

Page Ref: 5-6

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Pharmacological and Parenteral Therapies

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends; Transition and continuity. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.7. Summarize collaborative therapies used by interdisciplinary teams for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is preparing to analyze an arterial blood gas to determine if a client has an acid-base imbalance. In which order will the nurse analyze this laboratory test?

Look at the PaCO₂.

Look at the pH.

Evaluate the relationship between pH and PaCO₂.

Look at the bicarbonate in relation to the pH.

Answer: 2, 1, 3, 4

Explanation: 1. The second step is to look at the PaCO₂. If the PaCO₂ is <40, then more carbon dioxide is being exhaled. If the PaCO₂ is >40, then more carbon dioxide is being retained.

The pH is the first step and is analyzed to determine if acidosis or alkalosis is present. A pH of <7.35 is acidosis. A pH of >7.45 is alkalosis.

The third step is to evaluate the relationship between the pH and the PaCO₂. This relationship could indicate a respiratory problem. If the pH is acidotic and the carbon dioxide level is greater than 40, then the client could be experiencing respiratory acidosis. If the pH is alkalotic and the carbon dioxide level is below 40, then the client could be experiencing respiratory alkalosis.

The fourth step is to look at the bicarbonate level in relation to the pH. If both the pH and bicarbonate level is decreased, then the client has metabolic acidosis. If the pH and bicarbonate levels are increased, the client has metabolic alkalosis.

Page Ref: 11

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

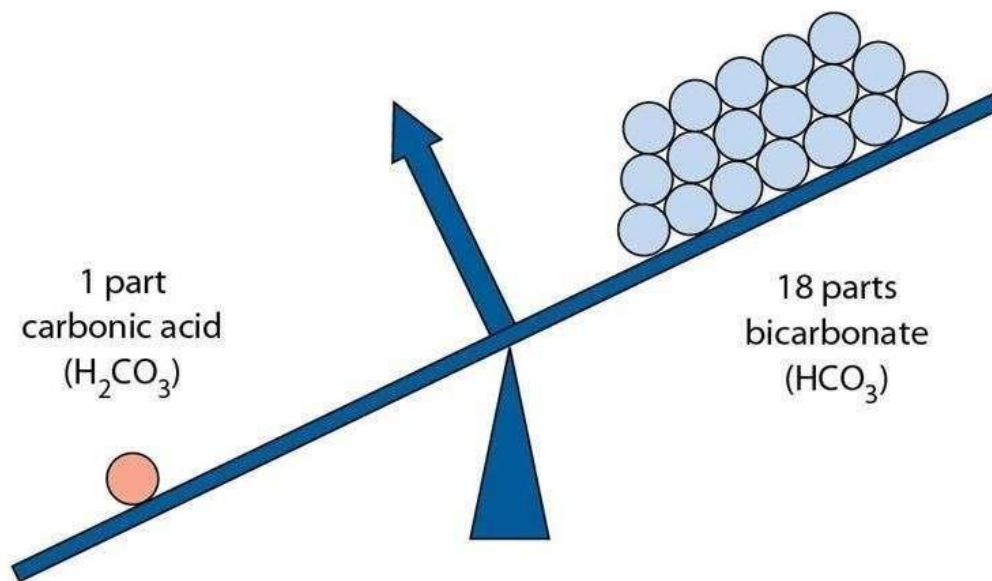
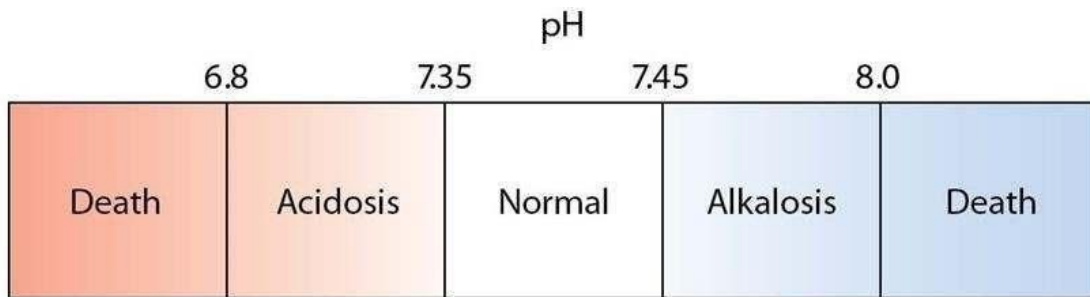
Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. |

NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is identifying a diagram to use to explain a client's acid-base balance. Which imbalance does the diagram suggest is occurring with the client?



Metabolic acidosis
Metabolic alkalosis
Respiratory acidosis
Respiratory alkalosis

Answer: A

Explanation: A) In metabolic acidosis, the amount of bicarbonate decreases in relation to the amount of acid in the body.

In metabolic alkalosis, there is an excess of bicarbonate in relation to the amount of hydrogen ions.

Respiratory acidosis occurs when carbon dioxide is retained, increasing the amount of carbonic acid in the body.

Respiratory alkalosis can occur when too much carbon dioxide is lost and carbonic acid levels fall.

Page Ref: 5

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment
Learning Outcome: 1.2. Differentiate alterations in acid-base balance.
MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The results of a client's arterial blood gas sample reveal an oxygen level of 72 mmHg. For which associated health problem should the nurse assess this client?

Stress and coping

Perfusion

Fluid and electrolyte imbalance

Cognition

Answer: D

Explanation: A) Stress and coping may need to be analyzed to determine how the client is coping with the anxiety related to low oxygen levels, but this is not directly a physiological health problem.

Perfusion is affected by a reduction in circulating fluids.

With a fluid and electrolyte imbalance, there is another disorder affecting acid-base balance. This might not be affected by oxygen level.

An oxygen level of less than 75 mmHg can be due to hypoventilation. This drop in oxygen will change the client's level of responsiveness.

Page Ref: 10

Cognitive Level: Analyzing

WWW.TBSM.WS

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.3. Outline the relationship between acid-base balance and other concepts.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is caring for a comatose client with metabolic acidosis. For which intervention will the nurse need to collaborate when caring for this client?

Measuring vital signs

Measuring intake and output

The client's recent eating behaviors

Identifying current oxygen saturation level

Answer: C

Explanation: A) Measuring vital signs is an independent nursing action.

Measuring intake and output is an independent nursing action.

For clients in severe distress, family members may need to be consulted for critical information such as recent eating habits and history of vomiting.

Identifying current oxygen saturation level is an independent nursing action.

Page Ref: 12

Cognitive Level: Understanding

Client Need/Sub: Safe and Effective Care Environment: Management of Care

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends; Transition and continuity. | AACN Domains and Competencies: 2.2 Communicate effectively with individuals. | NLN Competencies: Relationship Centered Care: Effective communication. | Nursing Process: Planning
Learning Outcome: 1.7. Summarize collaborative therapies used by interdisciplinary teams for clients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is beginning to review a client's arterial blood gas results. Which ion is measured to determine the pH?

Cl⁻

H⁺

Na⁺

HCO₃

Answer: B

Explanation: A) Chloride (Cl⁻) concentrations are not related to pH.

The pH measures the concentration of hydrogen ions (H⁺) in the body.

Sodium (Na⁺) concentrations are not related to pH.

Bicarbonate (HCO₃) is a weak base that is used as a buffer to help maintain the proper pH, but it is not used to measure pH.

Page Ref: 3

Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.1. Analyze the physiology of normal acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

A client with a suspected acid-base imbalance has an arterial blood gases bicarbonate level of 18 mEq/L. In which way will the nurse interpret this result?

Slightly high

Slightly low

Extremely high

Within normal range

Answer: B

Explanation: A) The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is not slightly high.

The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is slightly low.

The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is not extremely high.

The normal serum bicarbonate level is 22-26 mEq/L. A value of 18 mEq/L is not within the normal range.

Page Ref: 4

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. |

NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.1. Analyze the physiology of normal acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse notes that a client's acid-base balance changes reflect hypoventilation or hyperventilation. On which concept will the nurse focus when planning care for this client?

Oxygenation

Perfusion

Cognition

Stress and coping

Answer: A

Explanation: A) Hypoventilation and hyperventilation are related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis.

Perfusion, does not directly relate to hypo- or hyperventilation.

Cognition does not directly relate to hypo- or hyperventilation.

Hypoventilation and hyperventilation are related to oxygenation. Respiratory rate helps regulate carbon dioxide pressures, which can contribute to acidosis or alkalosis. Stress and coping do not directly relate to hypo- or hyperventilation.

Page Ref: 10

Cognitive Level: Remembering

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.3. Outline the relationship between acid-base balance and other concepts.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

WWW.TBSM.WS

The nurse is reviewing a client's acid-base balance. Which factor will the nurse prioritize as a health promotion activity?

Conducting yearly health screenings.

Obtaining immunizations.

Beginning an exercise regimen.

Maintaining fluid balance.

Answer: D

Explanation: A) Conducting yearly health screenings are activities that can promote health in other areas.

Obtaining immunizations is an activity that can promote health in other areas.

Beginning an exercise regimen is an activity that can promote health in other areas.

Both overhydration and dehydration can result in acid-base imbalances. Therefore, health promotion should focus on maintaining fluid balance.

Page Ref: 8

Cognitive Level: Applying

Client Need/Sub: Health Promotion and Maintenance

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.8 Promote self-care management. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.4. Explain the promotion of healthy acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

A client needs to have a sample of arterial blood for blood gas analysis. For which reason will the modified Allen test be performed before drawing the blood?

Reduce the risk of bleeding or bruising of the arm

Determine if arterial puncture can safely be performed

Determine the oxygen saturation of the blood in the artery

Determine the pressure of the blood in the artery

Answer: B

Explanation: A) The modified Allen test does not reduce the risk of bleeding or bruising.

A modified Allen test is a measure of ulnar patency. The client elevates the hand and repeatedly makes a fist while the examiner places digital occlusive pressure over the radial and ulnar arteries of the wrist. The hand will lose its normal color. Digital pressure is released from one artery while the other remains compressed. The return of color indicates that the hand has good collateral supply of blood and that arterial puncture can safely be performed.

The modified Allen test does not measure oxygen saturation.

The modified Allen test does not measure artery pressure.

Page Ref: 10

Cognitive Level: Understanding

Client Need/Sub: Safe and Effective Care Environment: Safety and Infection Control

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.3 Integrate assessment skills in practice. |

NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Implementation

Learning Outcome: 1.5. Differentiate common assessment procedures and tests used to examine acid-base balance.

WWW.TBSM.WS

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is caring for a client with an acid-base imbalance. Which intervention will the nurse complete independently?

Monitoring intake and output

Drawing blood for ABGs

Giving sodium bicarbonate infusions

Administering oxygen via nasal cannula

Answer: A

Explanation: A) Monitoring intake and output is an independent nursing intervention that does not require a provider's orders.

Drawing blood for ABGs is an action that can be performed by the nurse, but must first be ordered by a provider.

Giving sodium bicarbonate infusions can be performed by the nurse, but must first be ordered by a provider.

Administering oxygen via nasal cannula can be performed by the nurse, but must first be ordered by a provider.

Page Ref: 12

Cognitive Level: Applying

Client Need/Sub: Safe and Effective Care Environment: Management of Care

Standards: QSEN Competencies: II.A.1. Describe own strengths, limitations, and values in functioning as a member of a team. | AACN Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Teamwork: Scope of practice, roles, and responsibilities of healthcare team members, including overlaps. | Nursing Process:

Implementation

Learning Outcome: 1.6. Analyze independent interventions nurses can implement for patients with alterations in acid-base balance.

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

The nurse is caring for a client with acid-base imbalance. For which reason will the nurse measure the client's daily weight?

Monitor oxygenation status

Monitor perfusion of organs

Monitor renal function

Monitor fluid balance

Answer: D

Explanation: A) A client's weight does not reflect oxygenation status.

A client's weight does not reflect perfusion of organs.

Daily weights can reflect renal function, but weight can fluctuate even if the kidneys are functioning properly.

Fluid balance must be maintained to support acid-base balance. If a client rapidly gains weight, it is a sign of fluid overload. If a client rapidly loses weight, it is a sign of dehydration. Both of these conditions can alter the acid-base balance, so a client's weight should be monitored daily.

Page Ref: 8, 12

Cognitive Level: Understanding

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.6 Demonstrate accountability for care delivery. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.6. Analyze independent interventions nurses can implement for patients with alterations in acid-base balance. www.tb-sm.ws

MNL LO: Analyze the concept of acid-base balance and its application to nursing care.

Exemplar 1.A Metabolic Acidosis

A client recovering from cardiac arrest has an arterial blood gas pH of 6.58. Which explanation will the nurse suspect is the reason for this pH level?

Increased lactic acid level

Decreased carbohydrates for fuel

Decreased renal perfusion

Increased loss of bicarbonate

Answer: A

Explanation: A) Lactic acidosis is a common type of acidosis in hospitalized clients and develops with excess production or diminished excretion of lactic acid from the blood. Lactic acid is produced by anaerobic metabolism of glucose which occurs in cardiac arrest. Lactic acid would increase in a client with diabetes when there is a lack of carbohydrates to be used for fuel.

The low pH that develops after a cardiac arrest is not due to decreased renal perfusion. The change in pH because of renal perfusion is due to an imbalance in bicarbonate level.

The low pH that occurs after a cardiac arrest is not caused by a loss of bicarbonate.

Bicarbonate loss occurs in severe diarrhea and gastrointestinal disorders.

Page Ref: 14

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: III.A.1. Demonstrate knowledge of basic scientific methods and processes. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Assessment

Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Describe the pathophysiology of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

The nurse is caring for a client who has been admitted with persistent diarrhea lasting 3 days. Which problems will the nurse identify for this client during the acute phase of the illness?

Select all that apply.

Potential for decreased cardiac output

Problems clearing the airway

Inability to control urine output

Lack of information about the health problem

Risk for falls

Answer: A, E

Explanation: A) Metabolic acidosis decreases cardiac output by decreasing contractility, slowing the heart rate, and increasing the risk for dysrhythmias.

The client with metabolic acidosis will not have problems clearing the airway.

The client with metabolic acidosis will not have a problem with controlling urine output.

The client may have a lack of information about the health problem but this is not the priority during the acute phase of the illness.

The client with metabolic acidosis is at risk for injury from falls due to altered mental status.

Page Ref: 17

Cognitive Level: Analyzing

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends; Transition and continuity. | AACN Domains and Competencies: 2.4 Diagnose actual or potential health problems and needs. | NLN

Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Diagnosis

Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

The nurse is caring for a client with metabolic acidosis. Which goals are appropriate for this client? **Select all that apply.**

The client will maintain a respiratory rate of 30 or more.

The client will describe preventative measures for the underlying chronic illness.

The client will maintain baseline cardiac rhythm.

The client will remain in a pH range from 7.25 to 7.35.

The client will take potassium supplements to increase potassium levels.

Answer: B, C

Explanation: A) The client's respiratory rate should be within normal range for age and condition.

Planning for the client with metabolic acidosis involves identification and treatment of the underlying cause and restoration and maintenance of acid-base balance. The client should be able to describe preventative measures for the underlying chronic illness that caused the metabolic acidosis to occur.

The client should be able to describe preventative measures to maintain the baseline cardiac rhythm.

The pH should be maintained between 7.35 and 7.45.

Taking a potassium supplement may cause hyperkalemia, which decreases cardiac output and worsens metabolic acidosis.

Page Ref: 17

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Reduction of Risk Potential

Standards: QSEN Competencies: III.A.2 Describe EBP to include the components of research evidence, clinical expertise and patient/family values. | AACN Domains and Competencies: 2.5 Develop a plan of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Planning

Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Apply the nursing process in providing culturally competent care to an individual with metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.

The nurse is caring for a client with renal failure and metabolic acidosis. Which clinical manifestation would indicate to the nurse that planned interventions to relieve the metabolic acidosis have been effective?

Decreased respiratory depth

Palpitations

Increased deep tendon reflexes

Respiratory rate of 38

Answer: A

Explanation: A) The client with metabolic acidosis will have an increased respiratory rate and depth, called Kussmaul respirations. Signs that care has been effective would include a decrease in the rate and depth of respirations.

Palpitations are not associated with metabolic acidosis.

Increased deep tendon reflexes are not associated with metabolic acidosis.

An increased respiratory rate, as indicated by a respiratory rate of 38, would indicate continued metabolic acidosis.

Page Ref: 15

Cognitive Level: Applying

Client Need/Sub: Physiological Integrity: Physiological Adaptation

Standards: QSEN Competencies: I.A.1. Integrate understanding of multiple dimensions of patient-centered care: Patient/family/community preferences, values; Coordination and integration of care; Information, communication, and education; Physical comfort and emotional support; Involvement of family and friends; Transition and continuity. | AACN Domains and Competencies: 2.7 Evaluate outcomes of care. | NLN Competencies: Knowledge and Science: Relationships between knowledge/science and quality and safe patient care. | Nursing Process: Evaluation

Learning Outcome: 1.A. Analyze metabolic acidosis as it relates to acid-base balance. Identify the clinical manifestations of metabolic acidosis.

MNL LO: Demonstrate understanding of the concept of acid-base balance in the care of a patient with metabolic acidosis.